

CLAIMS

What is claimed is:

1. A plasma processing chamber configured to receive a gas, comprising:

5 a first powered electrode configured to receive a workpiece, said first
powered electrode having a first electrode area ;

 a power generator operatively coupled to said first powered electrode
and configured to communicate power to said first powered electrode;

10 a second electrode disposed at a distance from said first powered
electrode, said first powered electrode and said second electrode configured to
convert said gas to a plasma, said second electrode have a second electrode
area; and

 a ground extension adjacent said first powered electrode and
surrounding said first powered electrode.

15

2. The plasma processing chamber of claim 1 further comprising at least one
confinement ring configured to confine said plasma, said at least one confinement ring
surrounding said first powered electrode.

20 3. The plasma processing chamber of claim 1 wherein said ground extension
further comprises a protrusion.

4. The plasma processing chamber of claim 3 wherein said ground extension surrounds said first power electrode.

5. The plasma processing chamber of claim 4 wherein said ground extension is 5 configured to drain charge from said plasma.

6. The plasma processing chamber of claim 1 wherein said ground extension surrounds said first power electrode.

10 7. The plasma processing chamber of claim 6 wherein said ground extension is configured to drain charge from said plasma.

15 8. The plasma processing chamber of claim 1 further comprising an electrode area ratio of greater than 1.0, said area ratio defined by dividing said second electrode area by said first electrode area, such that said second electrode area is greater than said first electrode area.

20 9. The plasma processing chamber of claim 1 wherein said second electrode further comprises a notch, said notch configured to increase said second electrode area.

10. The plasma processing chamber of claim 9 wherein said ground extension

surrounds said first power electrode.

11. The plasma processing chamber of claim 10 wherein said ground extension is configured to drain charge from said plasma.

5

12. The plasma processing chamber of claim 11 further comprising an area ratio of greater than 1.0, said area ratio defined by dividing said second electrode surface area by said first electrode area, such that said second electrode surface area is greater than said first electrode area.

10

13. A plasma processing chamber configured to receive a gas, comprising:

a first powered electrode configured to receive a workpiece, said first powered electrode having a first electrode area ;

a power generator operatively coupled to said first powered electrode

15 and configured to communicate power to said first powered electrode;

a second electrode disposed above said first powered electrode, said first powered electrode and said second electrode configured to convert said gas to a plasma;

a ground extension adjacent said powered electrode and surrounding

20 said first powered electrode, said ground extension separated from said first powered electrode by a dielectric; and

at least one confinement ring configured to confine said plasma, said at

least one confinement ring surrounding said first powered electrode.

14. The plasma processing chamber of claim 13 wherein said ground extension is configured to drain charge from said plasma.

5

15. The plasma processing chamber of claim 14 further comprising an area ratio of greater than 1.0, said area ratio defined by said second electrode surface area to said first electrode area, such that said second electrode surface area is greater than said first electrode area.

10

16. The plasma processing chamber of claim 15 wherein said ground extension includes a protrusion.

15

17. The plasma processing chamber of claim 16 wherein said second electrode further comprises a notch, said notch configured to increase said second electrode area.

18. A method for generating a confined plasma in a plasma processing chamber, comprising:

20

receiving a gas in said plasma processing chamber;
causing a first electrode to receive a workpiece, said first electrode operatively coupled to a power supply;

causing a second electrode disposed at a distance from said first electrode to receive RF power from said first electrode, said second electrode having a second electrode area that is greater than said first electrode area; engaging a power supply to communicate RF power to said first electrode to generate a plasma; and

5 causing a ground extension adjacent said first electrode to drain a plurality of charge from said plasma.

19. The method of claim 18 further comprising draining said plurality of charge at
- 10 a plasma boundary defined by at least one confinement ring.
20. The method of claim 19 wherein said receiving said gas is transferred at a flow rate of up to 1500sccm.
- 15 21. The method of claim 19 wherein said engaging said power supply further comprises communicating RF power of up to 2 W per cm^3 of plasma volume.